

Rock Creek Assessment Unit (SK019)

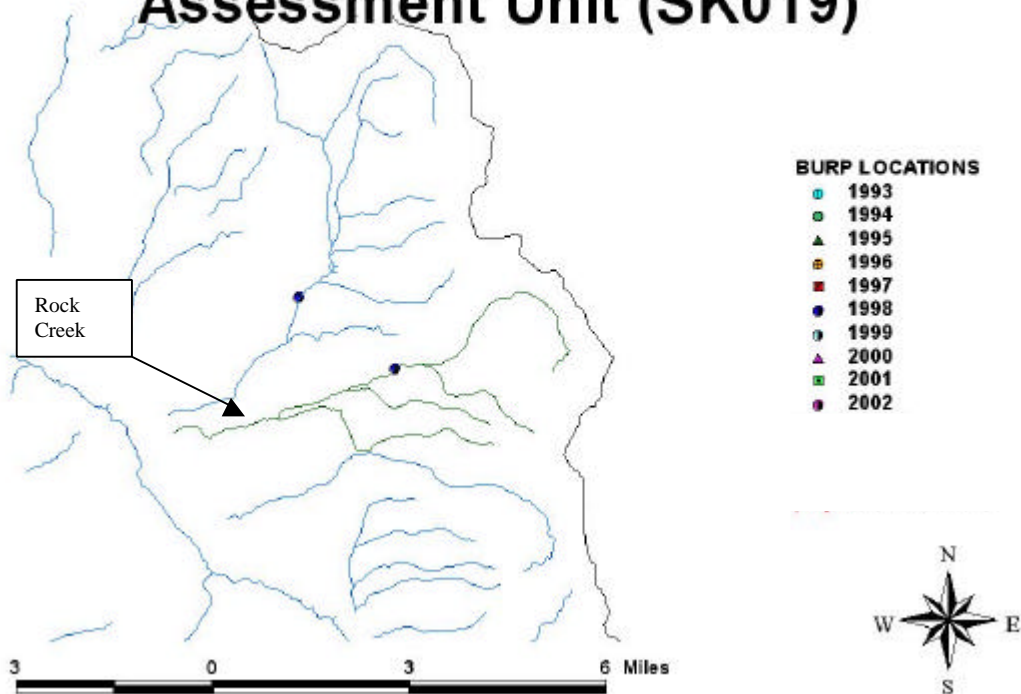


Figure 27. Rock Creek assessment unit.

Lone Cedar Creek is a perennial stream that infiltrates into alluvium well above its confluence with the Big Lost River (Figure 28). It doesn't connect during other than extreme runoff events. At 6780 ft elevation there are juniper trees growing in the stream channel. Land management is primarily BLM over the ephemeral reach and Forest Service over the upper elevations in tight canyons. Land use is primarily grazing on BLM and lower Forest Service.

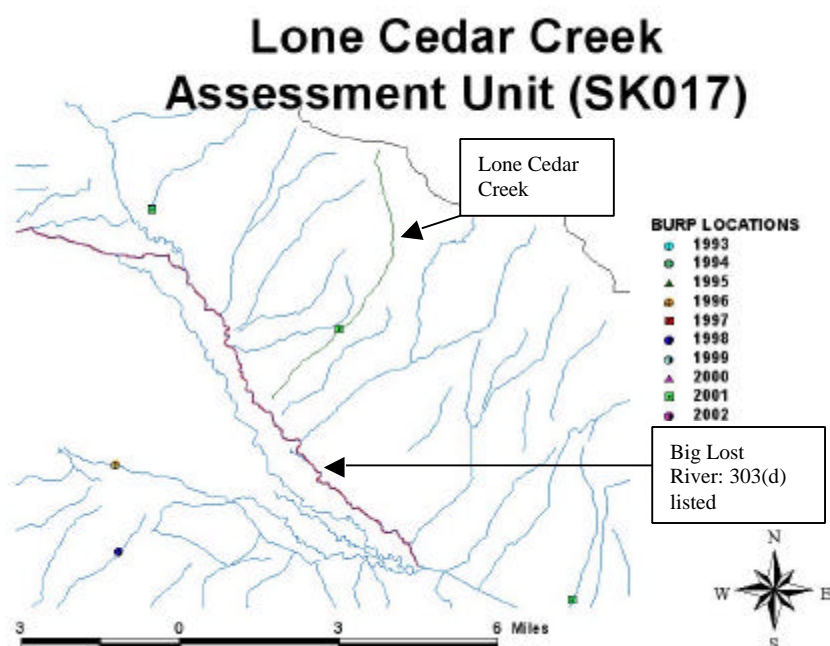


Figure 28. Lone Cedar Creek assessment unit.

The Big Lost River infiltrates into alluvium at Chilly Butte, at the Chilly Sinks, and the Big Lost River Channel remains dry to the confluence of Thousand Springs Creek throughout the majority of year when snowmelt runoff is not at its peak. The Big Lost River from Thousand Springs to Jones Creek does not have any perennial surface connection with tributaries other than Thousand Springs Creek. Surface water inflow from Thousand Springs Creek quickly infiltrates after its confluence with the Big Lost River. Land management is private along the main Big Lost River channel and BLM manages the uplands. The valley widens below Chilly Buttes and land use becomes slightly more diversified along this reach with forage crop production increasing. Groundwater pumping combined with surface diversion irrigation provides potential for irrigated pasture, alfalfa, and livestock watering. Residential developments are not common, but smaller tracts of land are found within the matrix of working ranches and farms. Recreational properties are being marketed, but the majority of residences are season long. Population density remains low and is not having a significant impact on water quality in the valley above Mackay Reservoir.

The remaining Assessment Unit watersheds of the upper Big Lost River subwatershed that originate in the Lost River Range above Mackay Reservoir are ephemeral. Surface water over the lower reaches infiltrates into alluvium and does not contribute flow to the Big Lost River. Land management is primarily BLM and land use is primarily grazing (Figures 29, 30 and 31). At Mackay Reservoir there are a number of boat ramps and developed camping facilities operated by the Bureau of Reclamation. One campground is managed by BLM. Mackay Reservoir is shown in Figure 32. Access is from Highway 93 and fishing and camping are the primary recreational activities as well as off-road vehicles, hiking and mountain biking.

Big Lost River: Thousand Springs to Jones Creek Assessment Unit (SK015)

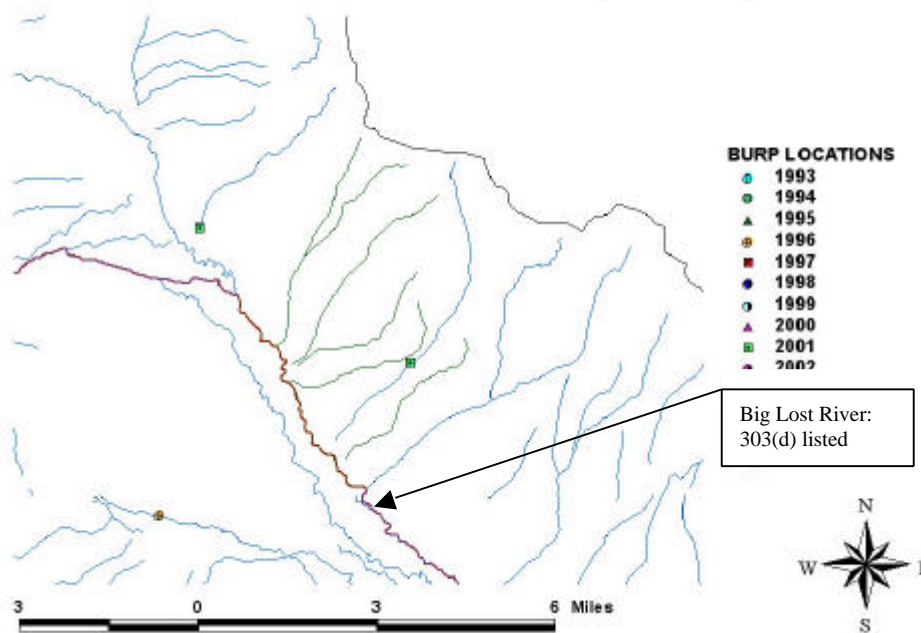


Figure 29. Big Lost River from Thousand Springs to Jones Creek assessment unit.

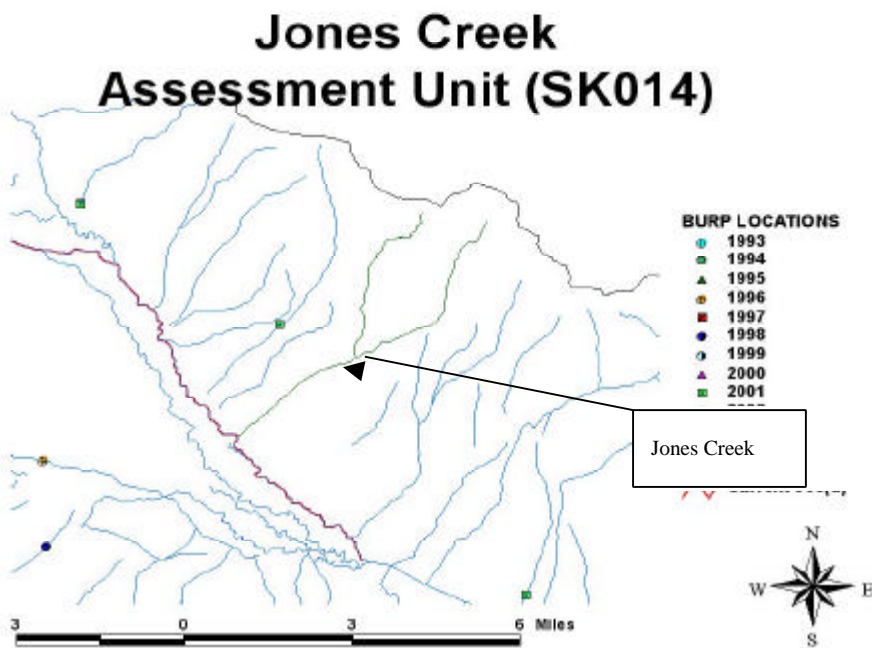


Figure 30. Jones Creek assessment unit.

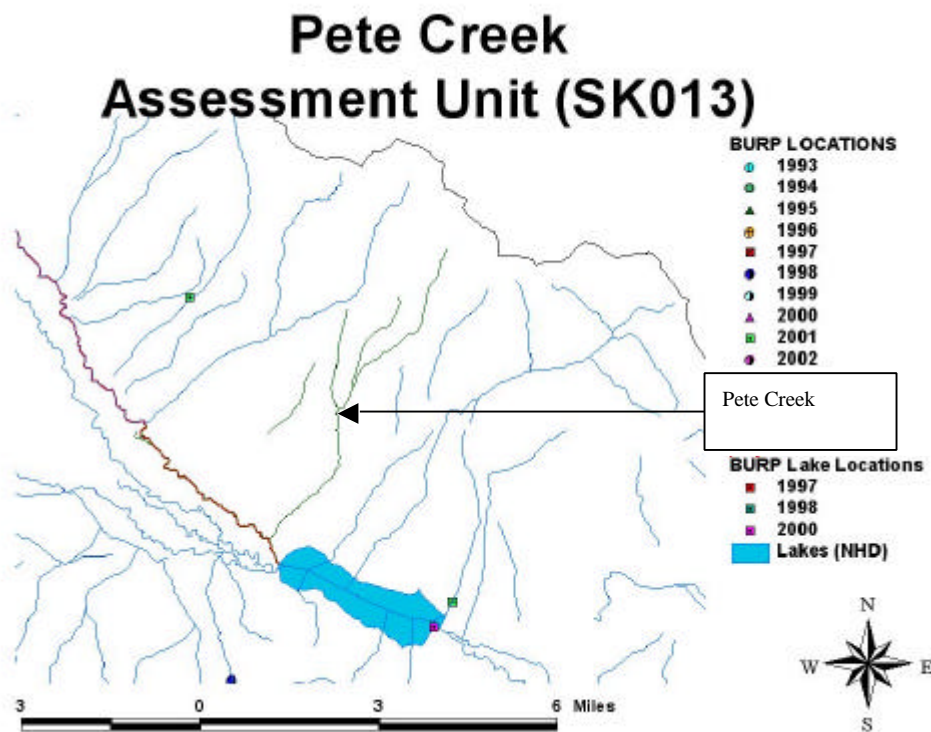


Figure 31. Pete Creek assessment unit.

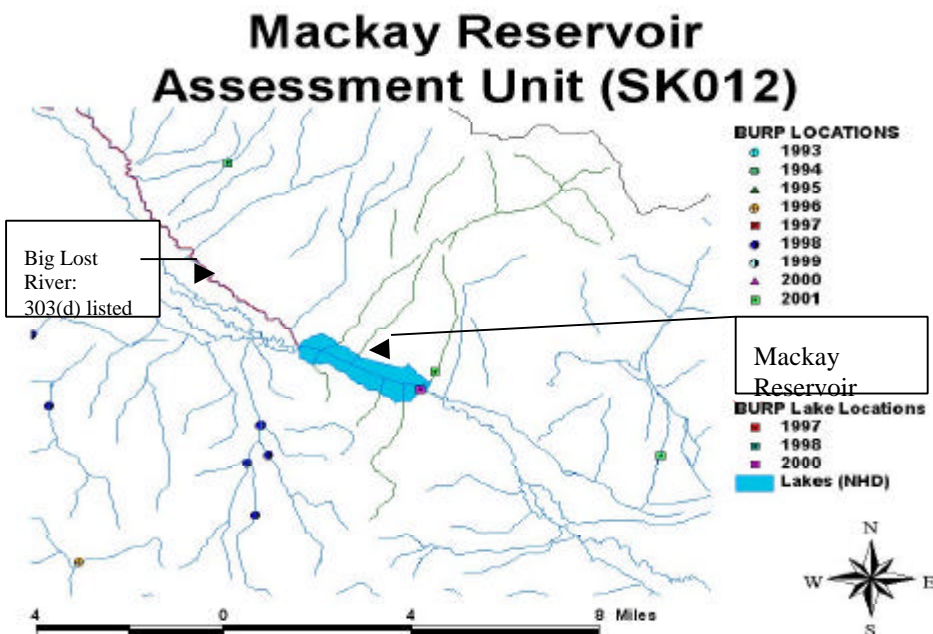


Figure 32. Mackay Reservoir assessment unit.

Warm Springs Creek originates at Hamilton Springs on the western side of the valley. This channel is also referred to as the North Channel, with the South Channel being Whiskey Springs, where the Idaho Fish and Game Hatchery (Mackay Hatchery) is. Flow from Hamilton Springs is remarkably variable in flow, but consistent in temperature at the source with flows over 36 cfs and temperature around 48°F making it an ideal resource for aquaculture. The majority of flow is immediately directed through a series of collection pipes through the Lost River Hatchery, a commercial trout hatchery. The effluent from the Lost River Hatchery combines with additional springs and forms the source of Warm Springs Creek which flows to the west to Mackay Reservoir across agricultural land that is used for grazing, forage crop production and residences. The major tributary to Warm Springs Creek is Whiskey Creek. Whiskey Creek, like Warm Springs Creek supplies water to the Mackay State Fish hatchery, a conservation and recreation oriented hatchery operated by the Idaho Department of Fish and Game. Flow ranges from 18cfs to 24 cfs with an average temperature of 52°F.

Warm Springs Creek is the only perennial stream that connects with the Big Lost River below Thousand Springs Creek above Mackay Reservoir (Figure 33). It functions as important spawning habitat and refuge to fish in Mackay Reservoir as well as resident species in Warm Springs Creek.

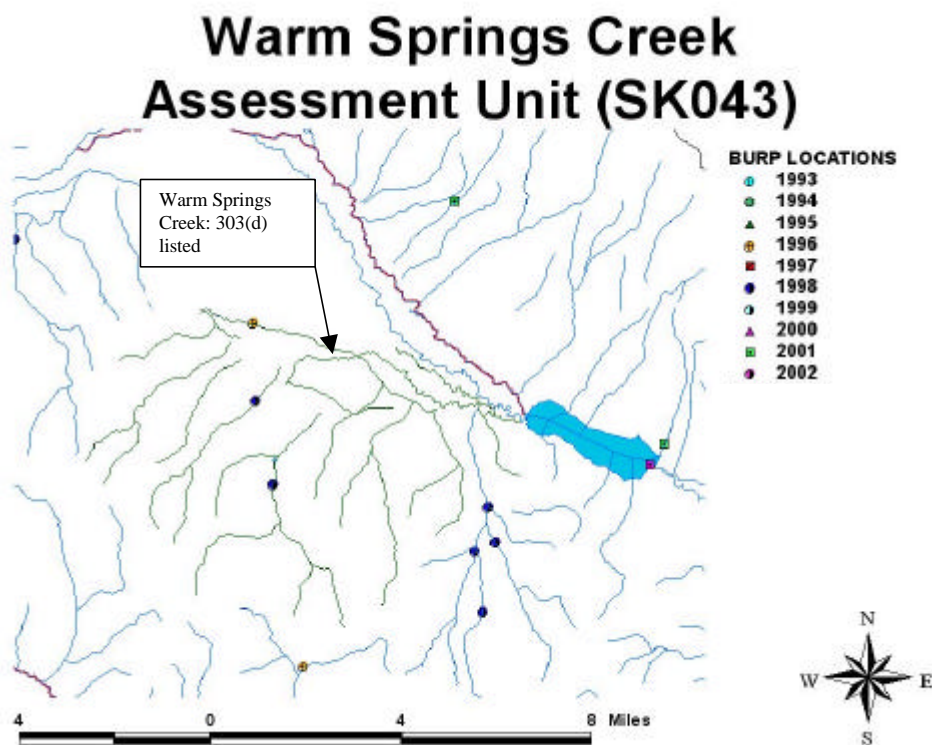


Figure 33. Warm Springs assessment unit.

Navarre Creek is a tributary to lower Warm Springs Creek just above the confluence with the Mackay Reservoir (Figure 34). It enters Warm Springs Creek in an area of wetlands and wet meadows that is also managed privately for grazing. The lower 1.5 miles of stream occurs on private land. The Middle 1.5 mile reach is on public land managed by BLM. The upper reaches

of the West, Middle and East Fork are on public land managed by Forest Service. Land use includes dispersed recreation and grazing.

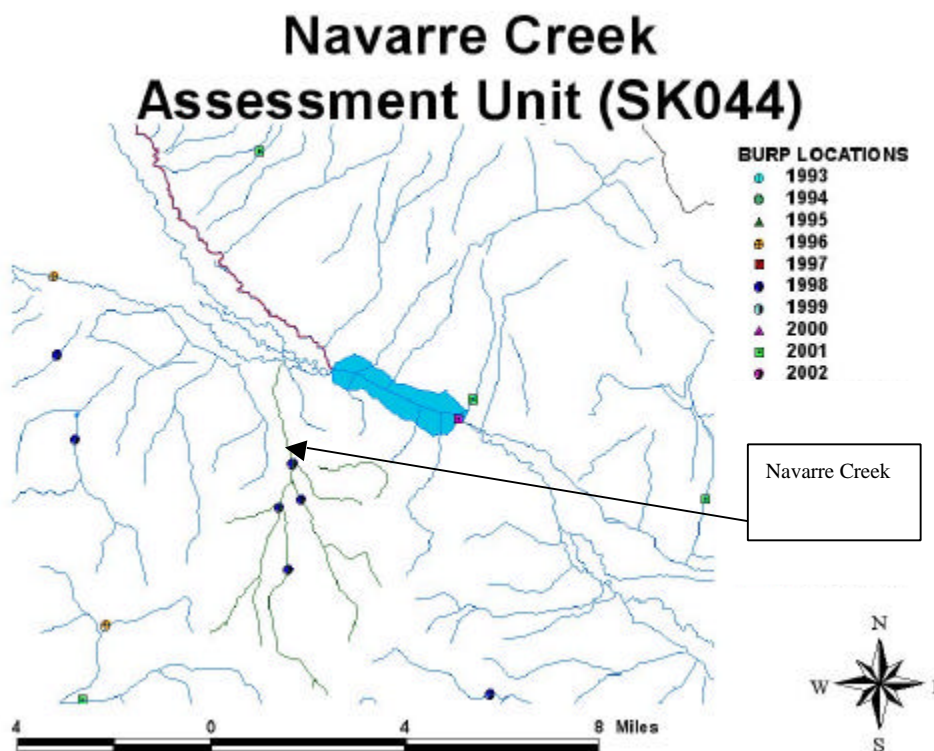


Figure 34. Navarre Creek assessment unit.

Antelope Creek

Antelope Creek has a watershed area of 657.5 km² with major tributaries consisting of Bear Creek, Cherry Creek, Dry Fork Creek, Spring Creek, Iron Bog Creek, Trail Creek, Timber Creek, and Leadbelt Creek (Figure 35). Flow is the result of snowmelt runoff and storm events. There is no consistent or significant irrigation return flow to the creek. Antelope Creek is formed by the confluence of Timber Creek and Trail Creek at an elevation of 7,289-ft AMSL (Figure 37). Antelope Creek is on the 303(d) list of impaired waters for major pollutants that include sediment, temperature and flow alteration. The 303(d) listed reach extends from the confluence of Spring Creek to the confluence of Antelope Creek with the Big Lost River. Flow is perennial only to the permanent diversion approximately 4.5 miles below the confluence of Cherry Creek, approximately 12 miles above the confluence with the Big Lost River. Over a short reach at this location the flow infiltrates into valley fill material, other than during peak runoff, when the point of infiltration moves downstream approximately 1 mile. Flow may occasionally reach the lower Antelope Creek Road bridge during above average runoff.

Property ownership over the listed reach is private. The floodplain and riparian zone has been heavily altered by conversion to irrigated pasture with limited irrigated crop production, primarily livestock feed. Winter range of livestock is a major land use along the listed reach.

Willows have been eradicated over much of this reach to increase forage production. Burning of riparian willows was observed over the upper listed reach as recent as fall 2002. There are numerous diversion structures that have resulted in head cutting. Recreation is limited to the upper watershed, above the listed reach, and consists of dispersed camping, off-road vehicles, and fishing. There is one developed campground near the confluence of Iron Bog Creek.

The upper watershed includes Trail and Timber Creek as well as Fox Canyon and Hurst Canyon Creeks and is characterized as a Rosgen B Channel in valley type II. This translates to a less sinuous moderately entrenched channel with a gradient between 2 and 4 percent in a valley with moderate relief and side slope gradients with a valley floor gradient less than 4% (Rosgen 1996).

Iron Bog Creek consists of Assessment Units SK054, 55 and 56 (Figure 36). At the confluence of Iron Bog Creek, just above Horsethief Creek, at elevation 6,790 feet, the valley begins to widen into a glacial outwash plain, valley type IX. Bear Creek makes its confluence about 3.75 miles below Iron Bog Creek. The Cherry Creek confluence is about 2 miles below Bear Creek and the channel transitions to a more sinuous C channel. The channel crosses the Antelope Creek Road and rapidly degrades to a less stable D channel as a result of willow eradication combined with the effects of grazing impacts and increased flow energy from the confluence of Cherry Creek and the Dry Fork Creek (Figure 42). The valley constricts below the Dry Fork Creek confluence over a distance of about a mile forcing the channel back into a B channel and then opens into valley type IX again where the channel emerges as an F channel to its infiltration zone where it is a 4th order stream.

Antelope Creek Subbasin Assessment Units (SK046-SK060)

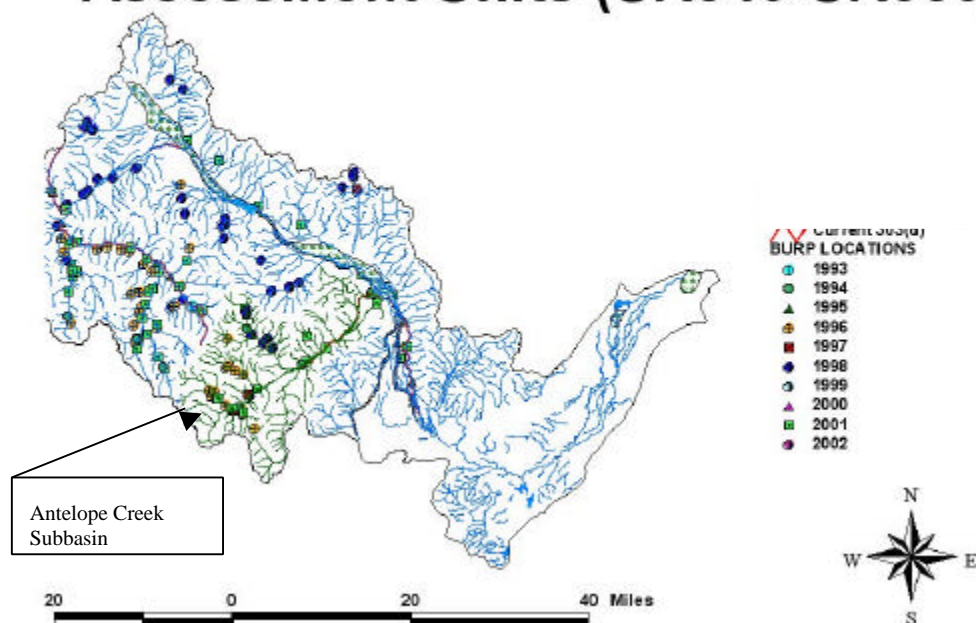


Figure 35. Location of the Antelope Creek subbasin in the Big Lost watershed.

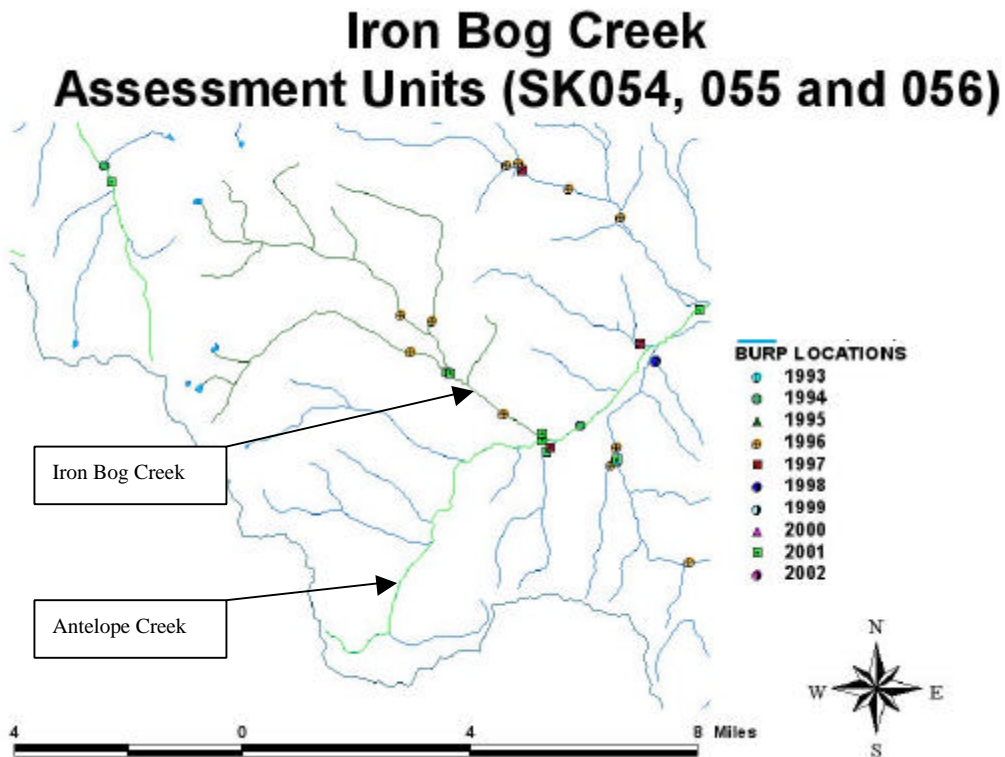


Figure 36. Iron Bog Creek assessment units.

Soils throughout the Iron Bog Creek watershed are derived from glaciated volcanics and sedimentary limestone. Sandy silt, poorly cemented silt and bentonite fractions of the outwash lakebed sediments and deposits of glacial till are prolific sediment sources to the river, particularly where riparian vegetation has been altered.

Bear Creek drains similar glaciated volcanic and sedimentary limestone subwatersheds from type II valleys transitioning from channel type A, with 4 to 10% slopes in entrenched confined channels, to B channels, and braided D channels as the valley broadens to the point of confluence with Antelope Creek (Figure 40). Cherry Creek emerges from a type II valley which transitions to a type IX valley (Figure 41). Channel type progresses from B, at upper elevations, where it hosts a series of senescent beaver dams, goes through a short valley constriction and transitions to an entrenched C channel on private land where the valley broadens to the confluence with Antelope Creek. Bear Creek is a 3rd order stream at its confluence.

Leadbelt Creek, 303(d) listed for sediment and temperature, enters the valley just upstream from Bear Creek (Figure 38). Leadbelt Creek is an ephemeral spring creek with flow less than 1 cfs that infiltrates shortly after it originates after flowing through a series of beaver dams. It only sporadically makes its confluence with Antelope Creek during periods of peak runoff. It is a 2nd order stream where it infiltrates.

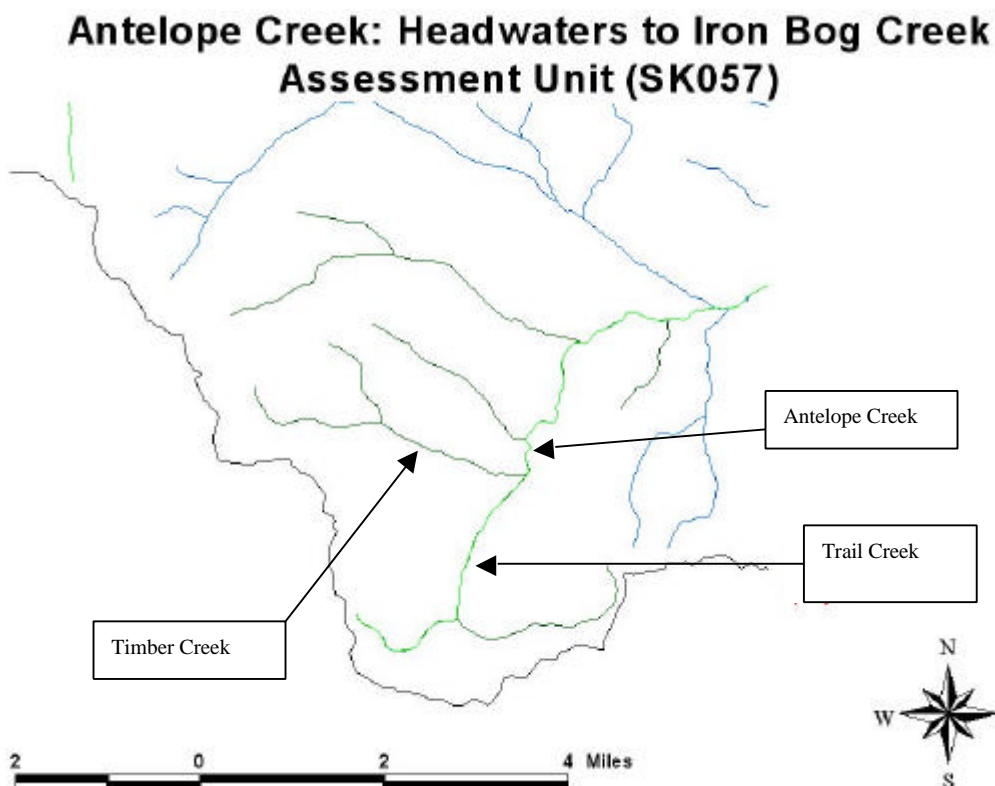


Figure 37. Upper Antelope Creek assessment unit.

Iron Bog Creek originates in alpine cirque lakes in volcanic geology and pours through A and B channels through type II valleys to its Confluence to form Antelope Creek. It is perennial and attains 3rd order at its confluence. On public land, managed primarily by the USDA Forest Service, land use is grazing and recreation. Grazing occurs throughout the upper watershed from June through October. Bank trampling, shearing, and widened stream channels are evident in all of the watersheds. Off-road vehicles have pioneered trails on hillsides and throughout riparian areas. These trails often lead to dispersed campsites primarily used during hunting seasons. There are numerous stream crossings with rills and gullies associated with hillslope trails. Mining has been limited in the watershed and primarily exploratory. There are no identified issues with mine waste rock or tailings.

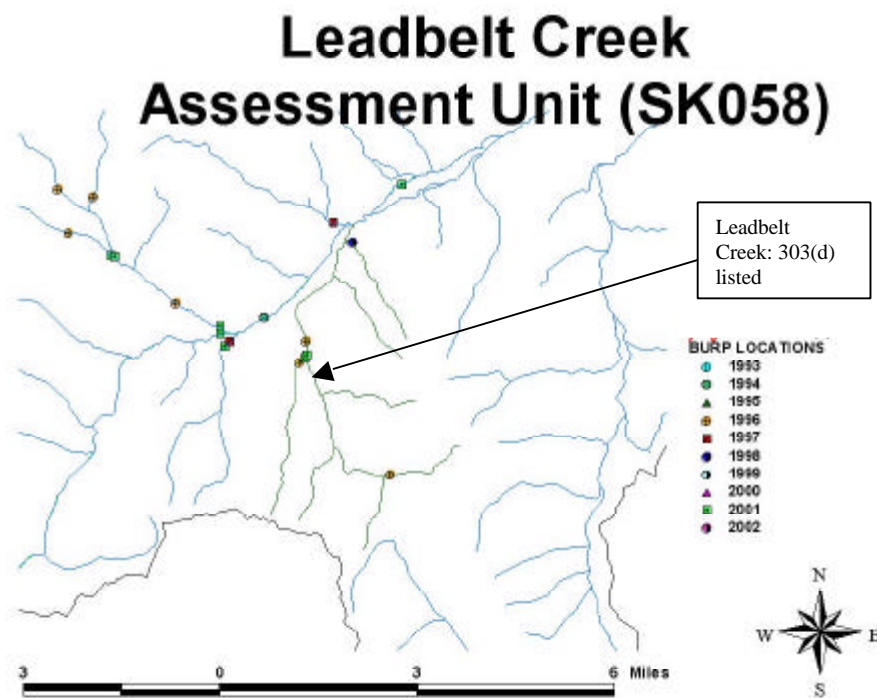


Figure 38. Leadbelt Creek assessment unit.

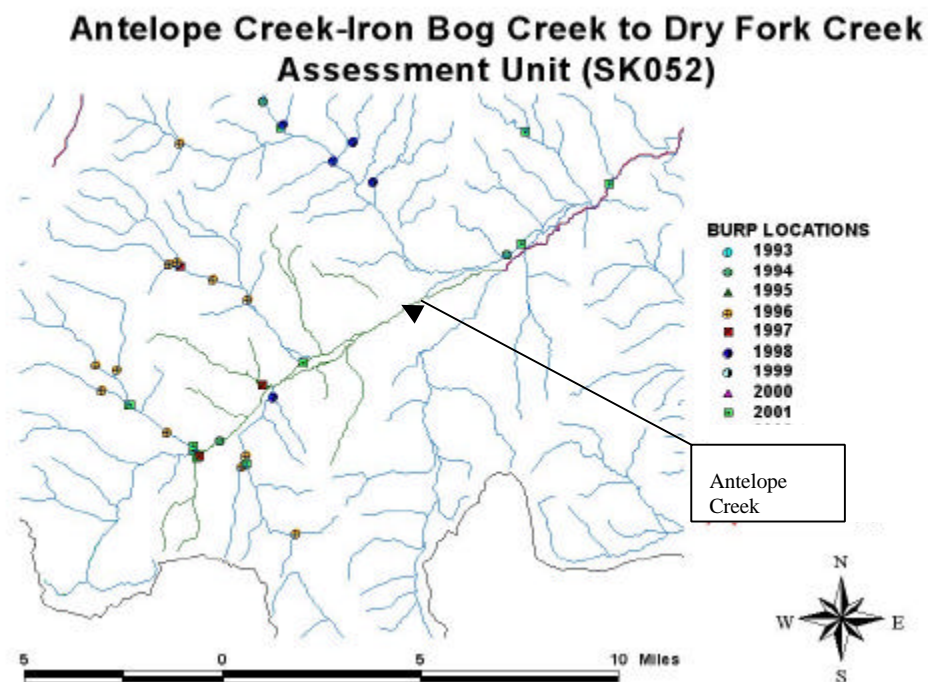


Figure 39. Antelope Creek Iron Bog Creek to Dry Fork assessment unit.

Dry Fork Creek Assessment Unit (SK059)

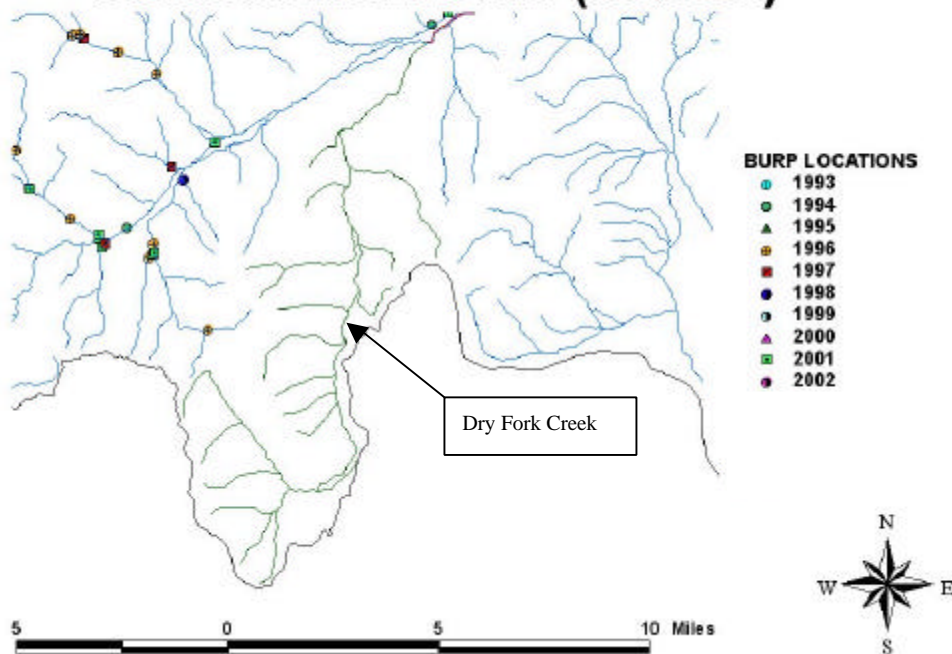


Figure 40. Dry Fork Creek assessment unit.

Bear Creek Assessment Unit (SK053)

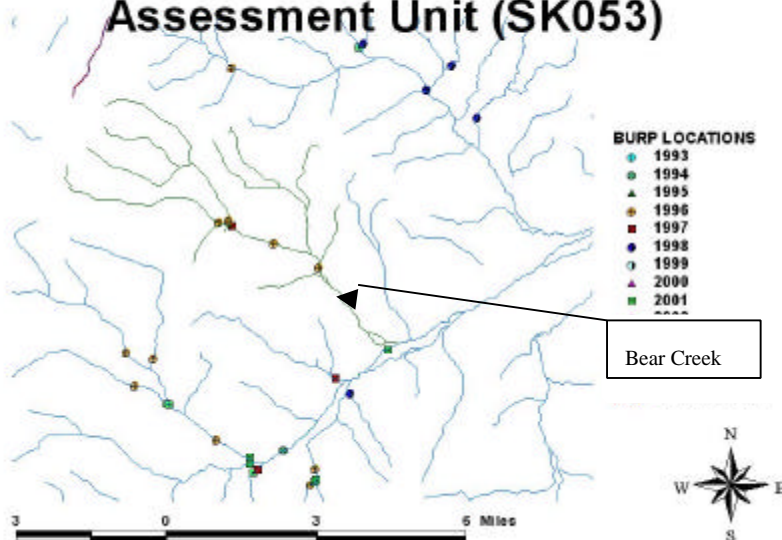


Figure 41. Bear Creek assessment unit.

Cherry Creek and Lupine Creek Assessment Units (SK049, 050, 051)

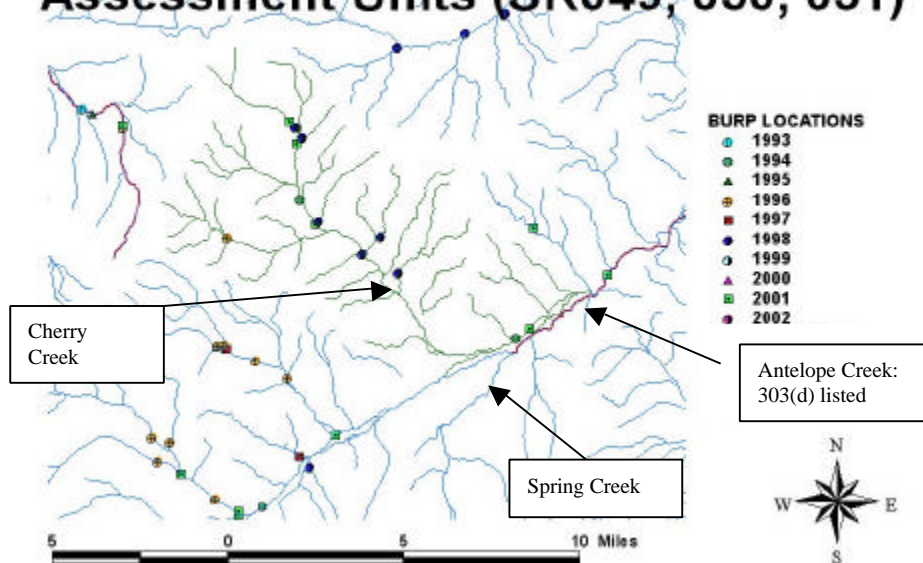


Figure 42. Cherry Creek assessment unit

Antelope Creek: Dry Fork Creek to Spring Creek Assessment Unit (SK047)

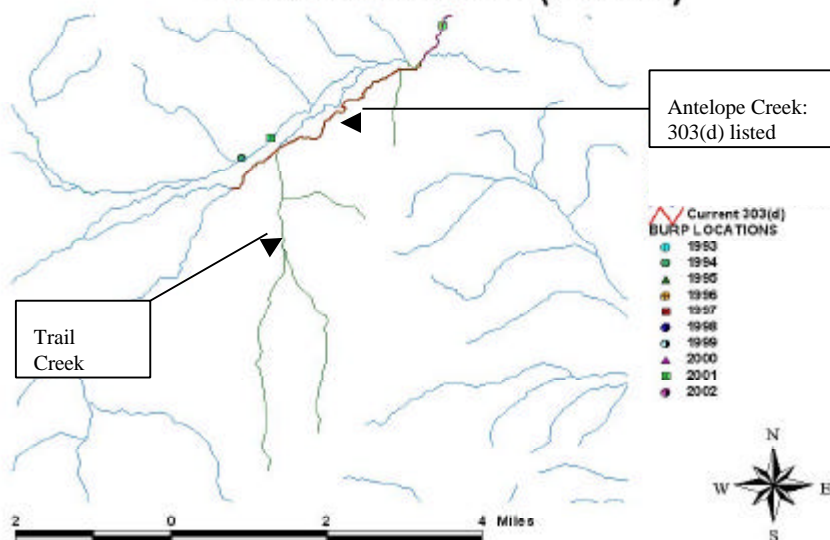


Figure 43. Antelope Creek Dry Fork Creek to Spring Creek AU.

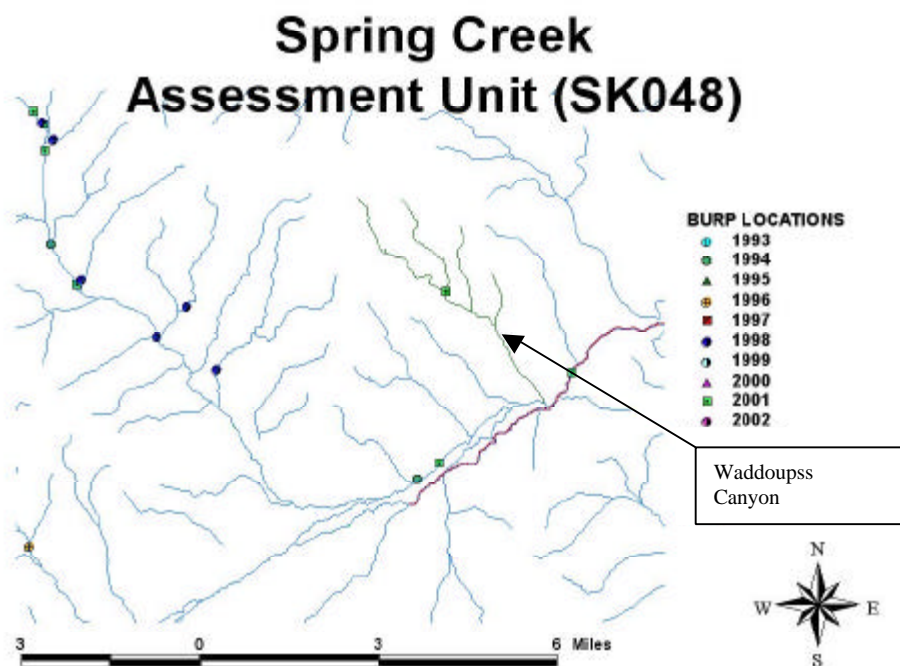


Figure 44. Spring Creek assessment unit.

From the confluence of Spring Creek (Dry Fork Creek) to the diversion structure where the South Fork of Antelope Creek begins is increasingly degraded. Alteration of riparian habitat is extensive in places and the effects are obvious. Vertical eroding streambanks dominate this reach. There is a short reach of improved riparian vegetative structure at a constriction several miles below Spring Creek. Below this constriction is the last diversion that sees perennial flow. This is where Antelope Creek breaks with a southern ephemeral channel that is known as the South Fork of Antelope Creek (Figure 45). This is actually a historic channel of Antelope Creek prior to the diversion and channelization of today. Below the diversion flow is of short duration and sporadic to the confluence with the Big Lost River (Figure 46).

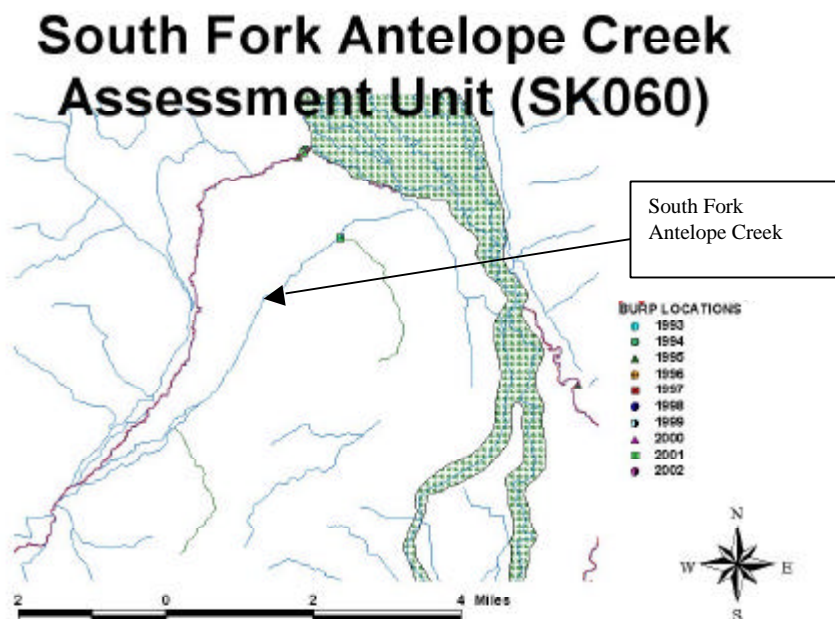


Figure 45. South Fork of Antelope Creek assessment unit.

Antelope Creek-Spring Creek to Mouth Assessment Unit (SK046)

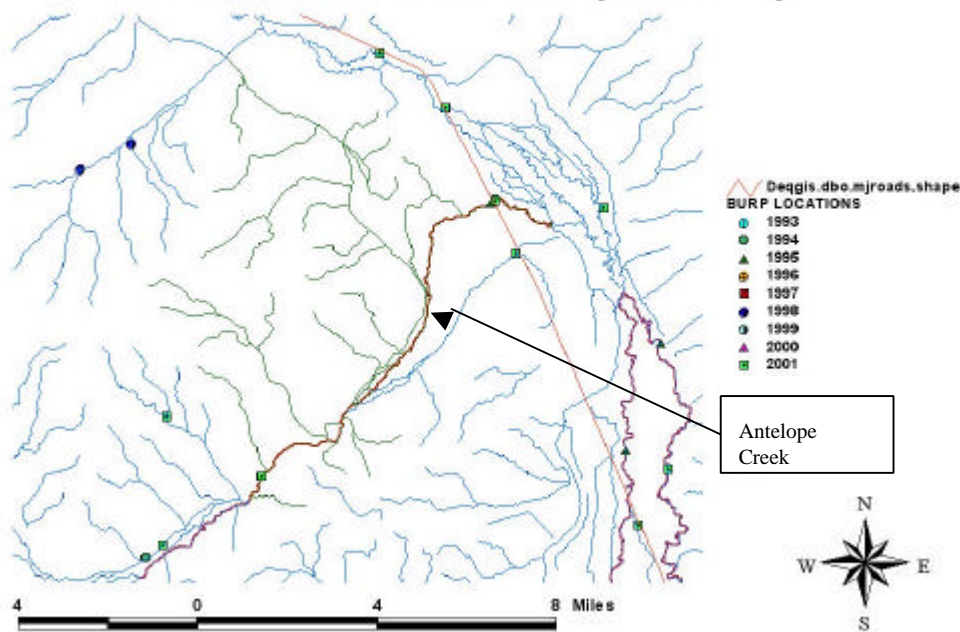


Figure 46. Lower Antelope Creek assessment unit.

Lower Big Lost River

The Lower Big Lost River Assessment Units include the segment of the river that is in full support of cold water aquatic life beneficial uses from the Mackey Dam to the Moore Diversion and the segment that is effected by flow alteration below the Moore Diversion (Figure 47). The City of Mackay is on the upper reach approximately 4 miles downstream of the Mackay Dam. The Moore Diversion occurs approximately 22 miles downstream of the Mackay Dam. Below the Moore Diversion the river is primarily dewatered for irrigation for 8 or more months per year. At the Moore Diversion there is an overflow channel that diverges from the primary channel known as Spring Creek. Spring Creek is actually an abandoned channel of the Big Lost River and will be addressed as the Big Lost River below the Moore Diversion in this document. The Spring Creek channel of the Big Lost River occasionally has surface flow when water is not entirely consumed for irrigation at the Moore Diversion and flow is high in the Big Lost River.

Below Mackay Dam there is a zone of spring recharge to the main flow of the Big Lost River, probably affiliated with the valley constriction at the location of the dam and groundwater recharge associated with the dam (Figure 48). Mackay Dam is operated exclusively as an irrigation reservoir though recreational uses exist. The volume of the reservoir is 45,000 acre feet with a surface area of 1,392 acres. The height of the dam is 67 feet. The original design was for a height of 120 feet, however during construction seepage at the toe of the dam became a concern and construction stopped short of the original design height. Seepage at the toe of the dam is monitored and measured through a weir. Concrete deterioration in the outlet control structure has required many repairs in past years. Repairs to outlet structures were made during the summer and fall of 2003. The outlet tunnel and area around the gates is inspected at least once per year.

Land management over the lower Big Lost River Assessment Units parallels that of the upper Assessment Units below Chilly Butte in that the valley bottom is privately owned with the exception of about 5 sections of land around Leslie Butte which is managed by the BLM. The intermediate elevations are managed by BLM with higher elevations managed by the Forest Service. Land use is primarily agricultural with increased diversity of crop production to include grains and potatoes as well as forage crops for livestock. Grazing is the most distributed agricultural land use in upland areas above the valley bottom. Historically mining has been a significant land use throughout the lower though there are no active mine operations other than gravel pits today. Irrigation diversion structures are numerous within the Big Lost River Channel below the Mackay Dam. There are no known fish screens within the valley, as required by Idaho law, above or below the dam. Many of the irrigation diversion structures in the main channel and tributary streams are fish passage barriers.

Lower Big Lost River Assessment Units (SK011-SK001, SK045 & SK061)

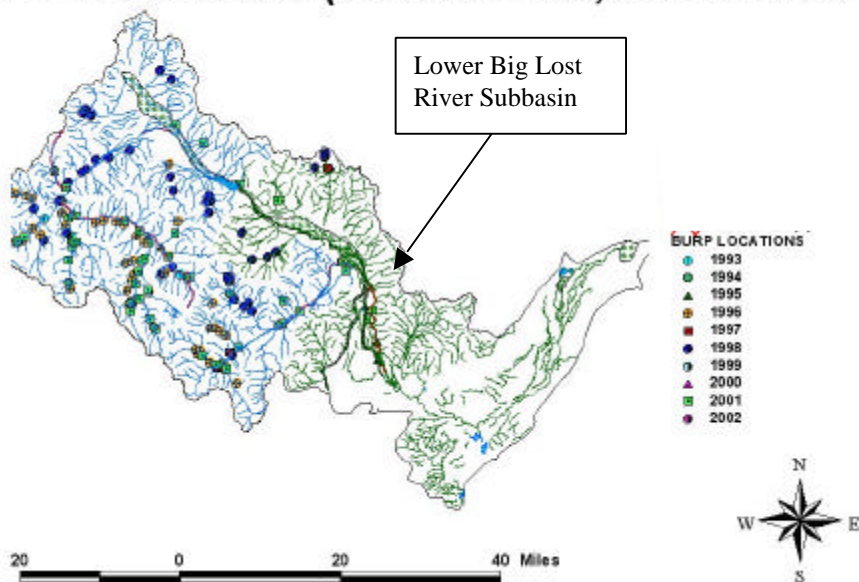


Figure 47. Lower Big Lost River assessment units in the Big Lost River watershed.

The Big Lost River below Mackay Dam is a regionally famous tailwater fishery that benefits from improved temperature regime and reduced sediment load below the reservoir. There is a population of naturally producing rainbow trout on this reach that is augmented by entrainment of stocked hatchery fish from the reservoir. This is the most populated (and popular) reach of the river. Density of residences within the riparian area greatly increases below the dam and the river flows at the edge of Mackay, Idaho (Figure 49).



Figure 48. Mackay Dam, Mackay Reservoir, and the tailwater section of the Big Lost River.

The City of Mackay has a population of 566 based on the 2000 Census. City infrastructure includes a waste treatment facility and stormwater collection is incorporated into sewer lines. The point of discharge of the waste treatment facility is into a wetland, known as Swauger Slough, that is isolated from the Big Lost River, though it is located within the flood plain. Stormwater is discharged through the waste treatment facility as well. The only NPDES permit associated with the City is for the waste treatment facility. Impervious surfaces are limited to a few side streets and Highway 93. Most precipitation and snowmelt associated with city streets runs off to ditches that infiltrate the storm runoff water. There are a few dispersed residences between the dam and the city but development is limited.

Above the City of Mackay on the eastern slope of the White Knob Mountains (on the western side of the valley) there is a grouping of old mines no longer in production. The mines are located in the Taylor Canyon and Rio Grande Canyon and Alder Creek Canyon region of the White Knob Mountains. Products affiliated with these mines include tungsten, gold, silver, zinc, copper, molybdenum, lead, and iron. Milling and smelter operations were located near the town of Mackay, near the Big Lost River, at the mouth of Rio Grande Canyon. Tailings and slag piles affiliated with the mills and smelters are present, but IDEQ and USDA FS water quality sampling indicate no water quality impacts. Mines are located on Forest Service and private land.

Big Lost River: Mackay Reservoir to Beck and Evan Ditch Assessment Unit (SK011)

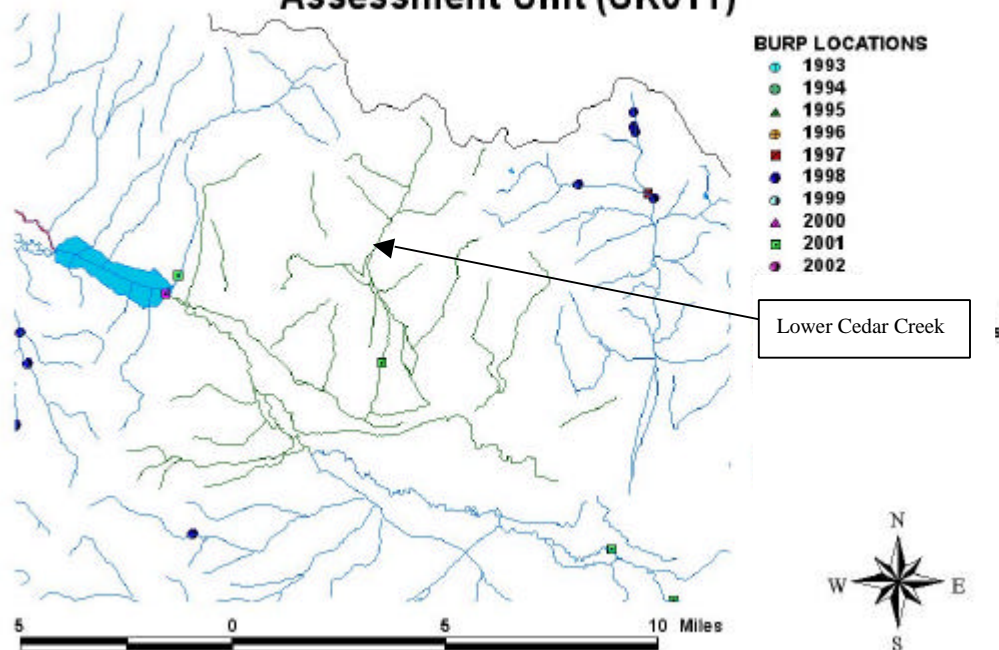


Figure 49. Mackay Reservoir to Beck and Evan Ditch assessment unit.

Lower Cedar Creek evolves in the Lost River Range on the east side of the valley in this Assessment Unit. It is an ephemeral stream that is on Forest Service and BLM managed lands with small private land in-holdings on BLM. Land use in the Lower Cedar Creek subbasin is primarily grazing with some crop production above the Holocene terrace.

Alder Creek, like Taylor Canyon and Rio Grande Canyon has experienced historic mining in its upper reaches with the same products and processing systems and facilities. Alder Creek is a perennial stream that does not connect to the Big Lost River during periods of peak flow because it is consumed for irrigation by the Darlington Ditch (Figure 50 and 51). Land management is largely Forest Service over the network of headwater tributaries that include the South Fork of Alder Creek and Trail Creek. As the name implies Alder Creek has a thick riparian zone that includes alder trees and aspen above private land. Below the Forest Service boundary Land management is private along a narrow buffer that includes the creek to its confluence and BLM outside of that. Present day land use includes recreation in the form of camping, fishing and hunting, and off-road vehicle use. Grazing occurs throughout the watershed and there is forage crop production on private land.